Navy Environmental & Preventive Medicine Unit No. 2
1887 Powhatan St.
Norfolk, VA 23511-3394
(757) 444-7671

02 October 2001

Medical Force Protection: El Salvador

Medical Force Protection countermeasures required before, during, and after deployment to the "area" are as follows:

Major Threats

Diarrhea, respiratory diseases, injuries, hepatitis A, dengue fever, leptospirosis, rabies, brucellosis, malaria, other arthropod-borne infections, sexually transmitted diseases, heat injury, and Chaga's disease. Water may be contaminated by raw sewage, industrial wastes, agrochemicals, and salt water intrusion.

Requirements before Deployment

1. **Before Deploying report to Medical to:**
   a. Ensure your Immunizations are up to date, specific immunizations needed for area: **Hepatitis A, MMR, Polio, Typhoid, Yellow fever, Tetanus (Td), and Influenza.**
   b. If you have not been immunized against Hepatitis A (two dose series over 6 months) get an injection of Immunoglobulin with the initial Hepatitis A dose.
2. **Malaria Chemoprophylaxis:**

Must include Primaquine terminal prophylaxis (see "Requirements after deployment")

   a. Chloroquine 500 mg/week 2 weeks prior to entering Belize, and until 4 weeks after departure.
   b. Mefloquine 250 mg/week 2 weeks prior to entering Belize, until 4 weeks after departure
   c. Doxycycline 100 mg/day 2 days prior to entering country, until 4 weeks after departure.

3. **Get HIV testing if not done in the past 12 months.**
4. **Make sure you have or are issued from unit supply: DEET, permethrin, bednets/poles, sunscreen and lip balm. Treat utility uniform and bednet with permethrin.**

Requirements during Deployment

1. Consume food, water, and ice only from US-approved sources; **"Boil it, cook it, peel it, or forget it"**.
2. Involve preventive medicine personnel with troop campsite selection.
3. Practice good personal hygiene, hand-washing, and waste disposal.
4. Avoid sexual contact. If sexually active, use condoms.
5. Use DEET and other personal protective measures against insects and other arthropod-borne diseases. Personal protective measures include but are not limited to proper wear of uniform, use of bed nets, and daily "buddy checks" in tick and mite infested areas.
6. Minimize non-battle injuries by ensuring safety measures are followed. Precautions include hearing and eye protection, enough water consumption, suitable work/rest cycles, acclimatization to environment and stress management.
7. Eliminate food/waste sources that attract pests in living areas.
8. Avoid contact with animals and hazardous plants.

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Requirements after Deployment

1. Receive preventive medicine debriefing after deployment.
2. Seek medical care immediately if ill, especially with fever.
3. Get HIV and PPD testing as required by your medical department or Task Force Surgeon.
4. Malaria terminal prophylaxis: Primaquine 15 mg/day beginning on day of departure from Belize for 14 days unless G-6 PD deficient

EL SALVADOR
VECTOR RISK ASSESSMENT PROFILE
(VECTRAP)

Prepared by: **Navy Disease Vector Ecology and Control Center**
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1. GEOGRAPHY: **Area** - 21,476 sq. km (8260 sq. mi.); about the size of Massachusetts. **Cities** - ***Capital*** is San Salvador (pop. 1,400,000). ***Other Cities*** - Santa Ana (132,000), San Miguel (85,000). **Terrain** - Mountains separate the country into three distinct regions; southern coastal belt, central valleys and plateaus, and northern mountains.

2. VECTOR BORNE DISEASES:

a. **Malaria**: *Plasmodium vivax* and *P. falciparum* are present country-wide in rural areas under 1,000 meters elevation; risk greatest in coastal areas below 600 meters elevation and is minimal in northern and central zones. The areas of highest risk are the Pacific coastal areas and along the eastern border with Honduras. Risk is elevated from June through September. Highly endemic, but with reported annual case totals declining during the 1980s from more than 93,000 cases during 1981 to fewer than 9,100 during 1988. *Plasmodium falciparum* currently causes less than 1 percent of reported malaria cases, with *P. vivax* accounting for the remainder. Chloroquine-resistant malaria has not been reported. The risk of acquiring malaria in endemic areas
is considered high without proper chemoprophylaxis and would result in a serious loss of combat effectiveness. Recent (1997) newspaper reports state that Ministry of Health officials have declared an "alert" for malaria in the western regions of El Salvador. No malaria has been reported from San Miguel, the largest city in eastern El Salvador. The reports stated that malaria is considered endemic in El Salvador, with more than 5,000 cases reported last year (1996).

b. **Dengue fever**: Recent outbreaks of Dengue Fever have been reported. Presumably year-round, risk elevated from June through December; primarily in urban areas at lower elevations. Incidence has been variable, with outbreaks occurring from June through Decem- ber. Most cases have occurred in the vicinity of San Salvador and in eastern regions bordering Honduras. Reports indicate that in late July 1995, there were 5,035 suspected cases, of which 377 were confirmed and 2 were DHF. Strains of dengue virus serotypes 1, 2, 3, and 4 have circulated during recent outbreaks. The potential risk of acquiring these diseases should be considered high as long as there is an existing population of the vector and a suitable reservoir. Combat effectiveness would be seriously reduced if dengue fever is acquired. As of October 1999, the El Salvador confirmed the death of 4 children and also said 21 children between the ages of 5 and 14 have been infected.

c. **Chagas' disease** (American trypanosomiasis) is vectored by triatomid bugs; enzootic in all rural areas less than 1,500 meters in elevation. Up to an estimated 9 percent of the total population may be infected; reportedly, about 13 percent of blood in blood banks is seropositive.

d. **Rickettsioses** (tick-borne; reportedly occur.

e. **Leishmaniasis**: Transmitted by the bite of an infective sand fly (*Lutzomyia* spp.) Undetermined; risk for cutaneous leishmaniasis (CL) presumably is limited to forested rural areas. Risk for visceral leishmaniasis (VL) associated with stone fences and stone piles (that shelter populations of the sand fly vector) in dry, warm valleys near the Honduran border. CL associated with *Leishmania mexicana* reportedly occurs in the Rio Lempa valley, but incidence data are not available. Only 4 cases of VL (attributed to *L. chagasi* infection, presumably with dogs being the enzootic reservoir) have been reported since 1950, all near the border with Honduras.

e. **Venezuelan Equine Encephalitis** (VEE) has been reported, however, the risk appears limited.

3. DISEASE VECTOR INFORMATION:

a. The main vector of malaria is the mosquito, *Anopheles albimanus*. *An. pseudopunctipennis* is a secondary vector. *An. albimanus* is reported to be resistant to the insecticides DDT, Dieldrin, Lindane, Chlorpyrifos, Fenitrothion, Malathion, Propoxur, and synthetic pyrethroids.

b. *Aedes aegypti* is the vector of yellow fever and dengue fever. *Ae. aegypti* is reported resistant to DDT, Dieldrin, Lindane, and Permethrin.

c. The vectors of Chagas' Disease are the reduviid bugs, *Triatoma dimidiata* and *Rhodnius prolixus*.

d. Ticks of the genus *Dermacentor* and *Amblyomma* are the vectors of tick-borne typhus.

e. Venezuelan Equine Encephalitis is transmitted by various mosquito species.

f. Leishmaniasis is vectored by sand flies. Most sand flies are active between dusk and dawn and have very limited flight ranges. Presumed vector species in El Salvador include *Lutzomyia longipalpus* for visceral leishmaniasis (VL), vector species for cutaneous leishmaniasis (CL) are undetermined.

4. DISEASE AND VECTOR CONTROL PROGRAMS:

a. Prevention & Control: Malaria chemoprophylaxis should be mandatory. Consult the Navy Environmental Preventive Medicine Unit #2 in Norfolk, VA (COMM: 757-444-7671; DSN: 564-7671; FAX: 757-444-1191; PLAD: NAVENPVNTMEDU TWO NORFOLK VA) for the current chemoprophylaxis recommendations.

b. Yellow fever immunizations should be current.

c. The conscientious use of personal protective measures will help to reduce the risk of many vector-borne diseases. The most important personal protection measures include the use of DEET insect repellent on exposed skin, wearing permethrin-treated uniforms, and wearing these uniforms properly. The use of DEET 33% lotion (2 oz. tubes: NSN 6840-01-284-3982) during daylight and evening/night hours is recommended for protection against a variety of arthropods including mosquitoes, sand flies, other biting flies, fleas, ticks and mites. Uniforms should be treated with 0.5% permethrin aerosol clothing repellent (NSN 6840-01-278-1336), per label instructions. NOTE: This spray is only to be applied to trousers and blouse, not to socks, undergarments or covers. Reducing exposed skin (e.g., rolling shirt sleeves down, buttoning collar of blouse, blousing trousers) will provide fewer opportunities for blood-feeding insects and other arthropods. Additional protection from mosquitoes and other biting flies can be accomplished by the use of screened eating and sleeping quarters, and by limiting the amount of outside activity during the evening/night hours when possible.

Bednets (insect bar [netting]: NSN 7210-00-266-9736) may be treated with permethrin for additional protection.

d. The most important element of an *Aedes aegypti* control program is SOURCE REDUCTION. Eliminating or covering all water holding containers in areas close to human habitation will greatly reduce *A. aegypti* populations. Alternatively, containers may be emptied of water at least once a week to interrupt mosquito breeding. Sand or mortar can be used to fill tree holes and rock holes near encampments.

e. Prevention of tick bites includes avoiding tick infested areas when feasible, mandating personal protection measures, clearing campsites of tall grasses and other low vegetation, and spraying area with an appropriate acaricide (always read and follow label instructions). Use the buddy system to search total body area every 3-4 hours for attached ticks. Prompt removal of attached ticks may prevent disease transmission.

f. Because the breeding habitats of most sand fly species are not easily identified, not easily accessible, or unknown, control strategies focus mainly on adult sand flies. Peridomestic sand fly species can be controlled by spraying residual insecticides on buildings (including screening on portals of entry) animal shelters, and other adult resting sites. Area chemical control of sylvan sand fly species is impractical. Personal protective measures will reduce sand fly bites and environmental modification (e.g., clearing forests, eliminating rodent burrows/breeding sites, relocating domestic animals away from human dwellings) has been used to reduce local sand fly populations.

5. IMPORTANT REFERENCES:

Contingency Pest Management Pocket Guide - Fourth Edition. Technical Information Memorandum (TIM) 24. Available from the Defense Pest Management Information Analysis Center (DPMIAC) (DSN: 295-7479 COMM: (301) 295-7479). Best source for information on vector control equipment, supplies, and use in contingency situations.

Control of Communicable Diseases Manual - Sixteenth Edition. 1995. Edited by A. S. Benenson. Available to government agencies through the Government Printing Office. Published by the American Public Health Association. Excellent source of information on communicable diseases.

Medical Environmental Disease Intelligence and Countermeasures - (MEDIC). September 1997. Available on CD-ROM from Armed Forces Medical Intelligence Center, Fort Detrick, Frederick, MD 21702-5004. A comprehensive medical intelligence product that includes portions of the references listed above and a wealth of additional preventive medicine information.

Internet Sites- Additional information regarding the current status of vector-borne diseases in this and other countries may be found by subscribing to various medical information sites on the internet. At the Centers of Disease Control and Prevention home page subscriptions can be made to the Morbidity and Mortality Weekly Report(MMWR)and the Journal of Emerging Infectious Diseases. The address is www.cdc.gov. The World Health Organization Weekly Epidemiology Report (WHO-WER) can be subscribed to at www.who.int/wer. The web site for PROMED is www.promedmail.org:8080/promed/promed.folder.home.
Although PROMED is not peer reviewed, it is timely and contains potentially useful information. The CDC and WHO reports are peer reviewed. Information on venomous arthropods such as scorpions and spiders as well as snakes, fish and other land animals can be found at the International Venom and Toxin Database website at www.uq.edu.au/~ddbfry/. Information on anti-venom sources can also be found at that site. Information on Poisonings, Bites and Envenomization as well as poison control resources can be found at www.invivo.net/bg/poison2.html.